and reweighed. They weighed 0·2 mgrm. less than before. The numbers were as follows:—

Potash bulbs before combustion	...	43·8308	
,, ,, after ,,	...	43·8776	
			·0468
Drying tube before combustion	...	26·4294	
,, ,, after ,,	...	26·4328	
			·0034
			·0502

This gives a composition of 97·85 per cent. of carbon, which is a pretty fair approximation to pure carbon. However, to determine whether or not this was the case, some further experiments were tried. A small quantity of the carbon was placed on the platinum boat and burnt in oxygen without any of the gas being allowed to pass out of the apparatus, and the mixed gases so obtained transferred to a eudiometer, and the carbonic acid and oxygen absorbed. It was then found that a residue amounting to about 3 per cent. of the carbonic acid was left unabsorbed by alkaline pyrogallate solution. This proved to be nitrogen. A blank experiment was done, but it gave only a minute bubble of nitrogen. Another experiment was performed with the following results:—

Total volume	183·7		
After absorption of CO_2	148·5	CO_2 =	35·2
After ,, O	1·1	O	147·4
		N	1·1

This plainly shows that nitrogen was present from some cause or another, and as every precaution was taken in transferring the gas from one vessel to another, and as the blank experiment showed nothing, I am inclined to believe that the carbon, or at least some portions of it, contained nitrogen chemically combined. The numbers above given are degrees on the eudiometer tube and are not more than one-third of a cubic centimetre each. Their exact value was of no consequence in the experiment, and the tube was only calibrated by comparing one part with another, and not with an absolute measure.

From the fact that no diamond was found when nitrogen compounds were absent, and from the fact that the mixed product (for only a portion of the 14 mgrms. was clear diamond) contains nitrogen, I am inclined to believe that it is by the decomposition of a nitrogenous body, and not the hydrocarbon, that the diamond is formed in this reaction. The experiments are, however, too few, and the evidence too vague, to draw any conclusions, as there are even very few negative experiments from which anything can be learned, most of the results being lost by explosion. I intend, when my other work—which I laid aside for the diamond experiments—is finished, to begin a series of experiments on the decompositions of carbon compounds by metals, to find whether a more easily-controlled reaction may not be discovered.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

THE following circular has been issued by the Science and Art Department:—"It having been represented to the Lords of the Committee of Council on Education that many parts of the kingdom are still in ignorance of the system of aid to the formation of classes for instruction in the principles of agriculture afforded by the Science and Art Department; that the supply of teachers who have obtained the necessary qualification to earn payments on results is very limited; and that a strict adherence to the rules of the Science Directory, which require that, in order to obtain aid, classes must be under the instruction of such teachers, would entail the delay of a year in the commencement of classes in this important subject, my Lords decide that §§ xxxiv. and xxxvi. of the Directory may be relaxed for this year in the following manner:—My Lords will be prepared to consider an application from any committee, formed in accordance with § x. of the Science Directory, to grant a temporary qualification to any person selected by it as fitted to teach the principles of Agriculture, and, if such application be found satisfactory, will permit the teacher to earn payments on the results of the examination in May, 1881; on the condition that this provisional qualification shall then determine, and that the only teachers who can after that date be recognised as qualified to earn payments on the results of their teaching in this subject will be such as have complied with the ordinary rules. In making the application the committee must show that there is no technically qualified teacher in the locality who could be employed to instruct the class, and also state the grounds on which the proposed teacher is considered to be really capable of giving instruction in agriculture, by his knowledge of chemistry and other sciences bearing on the subject."

MR. RICHARD CHARES ROWE, M.A., B.Sc., Fellow of Trinity College, Cambridge, has been appointed Professor of Mathematics in University College, London.

PLANS have been prepared for a new botanical class-room in connection with Edinburgh University, the present room being much too small. The plans have been submitted to Government; if approved there will be a grant for the purpose required. The new class-room proposed will be seated for six hundred students, while the old class-room will be altered so as to be used as a practical and histological class-room.

SCIENTIFIC SERIALS

American Journal of Science, June.—Physical structure and hypsometry of the Catskill Mountain region, by A. Guyot.—Recent explorations in the Wappinger Valley limestone of Dutchess Co., N.Y., by W. B. Dwight.—The colour-correction of certain achromatic object-glasses, by C. A. Young.—Note on the companion of Sirius, by A. Hall.—Study of the Emmet Co. meteorite that fell near Estherville, May 10, 1879, by J. Lawrence Smith.—Oxidation of hydrochloric acid solutions of antimony in the atmosphere, by J. P. Cooke.—Relation between the colours and magnitudes of the components of binary stars, by E. S. Holden.—Occurrence of true lingula in the Trenton limestones, by R. P. Whitfield.—Experiments on Mr. Edison's dynamometer, dynamo-machine, and lamp, by Profs. Brackett and Young.—On substances possessing the power of developing the latent photographic image, by M. Carey Lea.

Archives des Sciences Physiques et Naturelles, June 15.—Researches on the temperature of Lake Leman and other freshwater lakes, by Prof. Forel.—The disease of workmen employed in the St. Gothard tunnel, by Dr. Lombard.—Explosions by freezing, by Prof. Hagenbach.—On a yellow rain observed near Bonneville in Savoy, on April 25, 1880, by M. de Candolle.—Diatoms of the Alps and the Jura, and of the Swiss and French region in the environs of Geneva, by M. Bonn.—On a simplification of the theory of vibratory movements, by M. Cellérier.

Atti dei R. Accademia dei Lincei, fasc. 6, May.—Distribution of electricity in equilibrium on two parallel indefinite plane conductors, subjected to the induction of a point in the space included by them, by Dr. Maggi.—On a meteoric rain, containing an abundant quantity of metallic iron, observed at Cattania on the night of March 29-30, 1880, by Prof. Silvestri.—On bromocamphor, by Prof. Schiff.—Chemical and pathological studies on the hematopoetic function, by SS. Tizzoni and Fileti.—Influence of light on the production of hæmoglobin, by the same.—On ethylnaphtaline, by S. Camelutti.—On phenol derived from santonosic acid, by the same.—On a connection between meteorological phenomena and the time of arrival of the earth at perihelion, by Mr. Jenkins.—On the electric polarisation produced by metallic deposits, by Prof. Macaluso.—On the envelope and structure of the uveal tract in vertebrates, by Dr. Angelucci.—Helminthological observations on the endemic malady of the workmen in the St. Gothard (*Anchylostoma duodenalis*), by Prof. Perroncito.

Reale Istituto Lombardo di Scienze e Lettere. Rendiconti. Vol. xiii. fasc xii.—On the aberration of sphericity, &c. (continued), by Prof. Ferrini.—On injury to agriculture caused by the winter 1879-80, by Prof. Cantoni.—On a problem of electrostatics, by Dr. Maggi.

La Natura, vol. iv. Nos. 3 and 4 (February).—On some recent studies in agrarian meteorology, by S. Porro.—Morphogeny of animal individuality, by Dr. Cattaneo.

Bulletin de l'Academie Royale de Sciences de Belgique, No. 4, 1880.—Letter from Dr. Huggins on the subject of M. Fievez's recent note.

Journal de Physique, June.—Vibrations on the surface of a liquid in a rectangular vessel, by Prof. Lechat.—On the economic yield of electric motors, and on measurement of the quantity of energy which traverses an electric circuit, by M.

Deprez.—An experiment in physiological optics, by M. Bibart. —Measurement of the refractive indices of liquids, by MM. Macé de Lépinay.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, May 27.—"A Preliminary Account of the Reduction of Observations on Strained Materials, Leyden Jars, and Voltameters," by John Perry and W. E. Ayrton. Communicated by Prof. G. G. Stokes, Sec. R.S. [Abstract].

In discussing the residual-charge phenomena of condensers, the authors point out that in spite of certain elaborate measurements which have been made on different kinds of glass, nobody has yet discovered a constant such that it expresses the residual charge property of a particular substance. They therefore say that the simple plan of charging a Leyden jar for a long time, short-circuiting for a small definite period, then insulating and giving the residual charge at certain times from insulation (thus getting say three definite numbers for each dielectric experimented upon), is more accurate than, and is just as definite as, any plan hitherto proposed for determining the residual-charge properties of a dielectric. They show that if Prof. Clerk Maxwell is right, the only correct means of studying these properties are given by the constants of Maxwell's differential equation, and they describe experiments on the Leyden jar of a Thomson's electrometer, and reductions of observations to obtain such constants. Thus one such constant is found to satisfy all the observations made from the 500th to the 900th minute of insulation of a jar. The authors draw attention to the analogy which they have pointed out between condensers and voltameters charged by electromotive forces less than one and a half volts, and show that if we assume Maxwell's equation to be true for voltameters, that is, if we assume a voltameter to be a condenser, one constant satisfies observations from the 50th to the 190th minute of charging, and from the 20th to the 80th minute of discharging. They then proceed to develop a theory of the increasing strains in bodies subjected to constant stresses. When a homogeneous substance is suddenly subjected to stress, there is a suddenly produced strain which follows Hooke's law, depending on a constant k, but besides this there is a viscid increase of strain whose rate is proportional to the stress depending on a constant r. In steel the viscous strain is not of much importance, whereas in water strained by bodies moving in it it is very important, as it is also when a beam of sealing wax is loaded. They show that the viscid increase of strain is exactly analogous with the flow of electricity in accordance with Ohm's law, and that the suddenly-produced strain is analogous with induction; and considering a heterogeneous material subjected to shearing stress, they find that the above assumptions lead, for strained materials, to exactly the same equation as Prof. Maxwell found for condensers. They found that the support of this theory is exactly the same as the support which they have given of Maxwell's theory of condensers. Thus one constant of the equation satisfied the recovery from deflection of a glass beam from the 4th to the 240th hour of relief, and satisfied the recovery from twisting of a glass fibre for all but the first few observations. They have also constructed a voltameter such that the platinum electrodes may be maintained at any temperature in an atmosphere of any gas for any length of time, maintaining a vacuum over the liquid or saturating it with any gas, and they give the different values of the residual charge constant, which satisfies all but the first few observations of charge and discharge in different cases. The authors conclude their paper by saying that, regarding a voltameter as a condenser, then as the plates of the charging battery are larger and nearer together, and as the times of charge and discharge of the voltameter are made less and less, the more do the total quantities of the charge and discharge approximate to one another.

Physical Society, June 26.—Prof. W. G. Adams in the chair.—Mr. C. V. Boys read a paper, by Prof. Guthrie and himself, on the measurement of the conductivity of liquids by means of magneto-electric induction. The liquid is suspended in a glass vessel by a fine iron wire in the centre of a cylindrical electro-magnet formed of two semicircular parts. This electro-magnet is rotated at a velocity not exceeding 3,000 turns per minute, and the liquid being drawn round in the direction of rotation, the wire is subjected to torsion, which, under correction for certain errors, is proportional to the resistance of the liquid. The torsion is observed by means of a scale and microscope The results, plotted in a curve, agree very closely with those of Kohlrausch, obtained by alternate currents, and Dr. Guthrie thinks that they are probably more correct and trustworthy than Kohlrausch's, for the method would seem to be superior and the curve contains fewer excentric points than his.—Dr. Gladstone read a paper on the refraction equivalents of isomeric bodies, in which he described the present state of the subject and his own contributions to it. He showed that the refractive power of bodies over light was of great importance to chemists, since it depended on their essential structure.—Dr. Huggins described his latest results of star spectra, and illustrated his remarks by photographic spectra taken by his improved method. From these it appears certain stars, such as Vega, give a complete spectrum of hydrogen. Others, more yellowish in colour, show a thinning of these lines, such as Sirius, η Ursæ Majoris. Others show the intrusion of more refrangible lines; for example, Arcturus, α Aquilæ, α Virginius; while Capella gives a complex spectrum like that of the sun. Dr. Huggins also showed a spectrum of the flame of a spirit lamp, which presented a strong group of lines at S, and he considered it to represent the light emitted by the molecules of water. He further observed that the spectrum offered a highly sensitive test of the presence of carbon.—Mr. Liveing exhibited a new fire-damp indicator, capable of detecting ¼ per cent. of marsh gas in air. It is based on the fact that an incandescent body shows more brilliantly in proportion to the amount of marsh gas in the air, and consists of two fine platinum wires kept incandescent by a magneto-electric current sent through them in one circuit. One wire is excluded from the fire-damp, the other is exposed to it, and the relative intensities of the two glowing wires is compared by a photometric screen placed between them and adjustable to a position between them at which the reflections of the wires on the screen are of equal intensity. The position of the screen relatively to the wires is given by a scale, and measures the proportion of fire-damp in the air. This contrivance is more advantageous than the safety-lamp, which only indicates 2 per cent of marsh gas in the air.—Dr. Stone exhibited a vacuum-tube of variable resistance and a large electro-magnet wound with iron wire. The former consists of a barometer-tube thirty-two inches long, terminating above in a short vacuum-chamber arranged transversely, and closed at either end by adjustable india-rubber stoppers, through which platinum terminals are passed. Above this the vertical tube is continued to a glass stopcock, by means of which small quantities of air can be introduced. The foot of the tube is attached to an india-rubber flexible pipe with a cistern like that of Frankland's gas apparatus. The cistern full of mercury is counter-balanced, and can be raised or lowered at will through the whole thirty-two inches. A Torricellian vacuum can thus be made in the upper chamber, or one of more or less perfectness. On passing the induction-spark between the terminals in the former case all the discharge is carried off, none appearing at the discharger. By gradually raising and lowering the cistern, after admitting a little air by the stopcock, the resistance of the partial vacuum thus obtained can be altered within wide limits. A point can also be found where the spark of breaking-contact is shunted through the vacuum-tube, while the weaker discharge of making-contact is stopped. The induction-current is thus obtained in a single direction, a matter of some importance in physiological experiments. The electro-magnet could not be described from pressure of other matter. Its peculiarities consisted in its being wound with best charcoal-annealed wire of about 5 millim. section in four parallel circuits, and in each pole being cast, after winding into a solid block of paraffin. It was expected that the latter device would increase the inductive effect of the spirals; and indeed it appeared that the lifting power was somewhat strengthened. The cores had been originally wound with large copper wire of about the same weight as the iron wire. But the lifting power for batteries of moderate size, five or six Bunsen's cells, for instance, had increased fourfold after the substitution.—A paper by Mr. McFarlane Gray entitled specific heats calculated from entropy. This is a re-affirmation of a paper on the value of v, declined by the committee of the Royal Society in February, 1878. The author read a paper at the last meeting of the Institution of Naval Architects, which we said was a singularly bold and original attempt to account for many of the phenomena of steam and other effects of heat when applied to matter. In the present paper Mr. Gray continues in the same line of startling generalisation. The following is a specimen:—Taking the $p\,v$ of hydrogen at 493°·2 F., as in Rankine's tables, to be 378819 foot pounds, he writes—